R E M A R K S

In view of the Examiner's comments on the "rough translations from the original German," making it "difficult to read and understand," a Substitute Specification is submitted herewith, which is believed to facilitate a reading and understanding of the disclosure. Applicants' agent states that no new matter has been added, the changes being limited to linguistic improvements.

Referring particularly to the word "bias," this was a poor translation of the German word "Ueberhang." The word "overhang" means that the upper end of saw blades 5 projects a little from their lower end, i.e. the saw blades are cantilevered in the feed direction. In other words, the saw blades are inclined relative to the vertical guide of the saw frame so that the teeth of the saw blades cut uniform chips.

The claims have been rewritten in an effort to overcome the rejection under 35 U.S.C. 112. As now presented, the claims provide antecedent language for all positively recited features and are believed to set forth the disclosed subject matter in clear language. According to the invention, signal transmitter 17 transmits a signal indicating a preset position of rotation of slider-crank drive 4 to controlling system 12.

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Motors 10 for feed conveyor 6 is controlled independently of the position of rotation of the slider-crank drive by a stored control program for the conveying steps. To coordinate the intermittent conveying steps properly with the cutting strokes of saw frame 3, the conveying steps must be synchronized with the to and fro movements of the saw frame. This is achieved by the transmission of a signal indicating a preset position of rotation of the slider-crank drive by signal transmitter 17 to controlling system 12. When the frequency of the cutting strokes is increased, the feed speed of feed conveyor 6 must be increased correspondingly to obtain uniform cutting conditions. This means that the control program for the conveying steps must be adapted to the stroke frequency of slider-crank drive 4.

Rejection of generic claim 1, if applied to claim 6 replacing it, as anticipated by Traben, cited, under 35 U.S.C. 102(b) is respectfully traversed. The subject matter of claim 6 is respectfully submitted neither to be anticipated by the cited patent nor to be obvious therefrom.

Traben discloses control valve 10 for a hydraulic motor for feed rollers 6, the control valve being actuated by cam plate 19 mounted on main shaft 24 of the saw. This "allows the desired feed movement in dependence on the movement of the saw
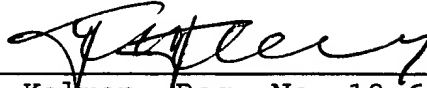
frame" (col. 3, lines 43/4). In other words, each position of
rotation of Traben's crank drive determines a corresponding
valve position producing a corresponding conveying step. This
is exactly what the claimed invention is designed to avoid,
i.e. the feed no longer depends on the position of rotation of
the crank drive. This is accomplished by using only a single
position of rotation of the crank drive for synchronization.
The feed itself is controlled by a stored control program for
the conveying steps, which is independent of the position of
rotation of the crank drive.

Traben neither discloses feature (e)(1) nor feature (f) of
claim 6. Since the Traben structure explicitly provides that
the control valve position depends on the position of rotation
of the crank drive, he cannot suggest to a person of ordinary
skill in the art that this dependence is to be avoided.
Accordingly, claim 6 is respectfully submitted to be
patentable. The Examiner indicated the dependent claims to be
allowable and, in fact, it is respectfully submitted that
claims 7-10 are allowable on their own merits.

A sincere effort having been made to overcome all grounds
of rejection, favorable reconsideration and allowance of claims
6-10 are respectfully solicited.

Respectfully submitted,

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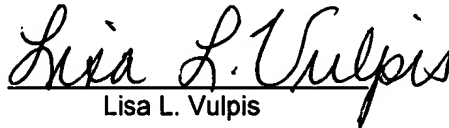Attorneys for Applicants

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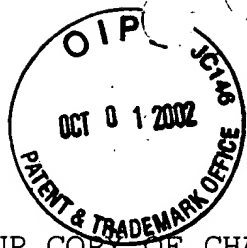1077 Northern Boulevard
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Enclosure: SUBSTITUTE SPECIFICATION
           MARKED-UP COPY OF CHANGES

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(signature)
Lisa L. Vulpis

CROSS REFERENCE TO RELATED APPLICATIONS

Applicants claim priority under 35 U.S.C. §119 of Austrian Application No. A333/99 filed on March 1, 1999. Applicants also claim priority under 35 U.S.C. §365 of PCT/AT2000/00052 filed on February 28, 2000. The international application under PCT article 21(2) was not published in English.

Field of the Invention

[[0001]] The invention relates to a mill saw with a saw [gate] frame driven [via] by a slider-crank drive, whose parallel saw blades, which cut only in one stroke direction, are [provided with a bias] cantilevered, and with a feed conveyor for the stock to be cut, which is driven intermittently during the cutting stroke of the saw [gate] frame as a function of the cutting speed by means of at least one motor separated from the slider-crank drive and connected to a controlling system.

Description of the Prior Art

[[0002]] To ensure, in spite of the sinusoidal speed gradient,

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[regular] <u>uniform</u> chip thicknesses over the cutting stroke in case of mill saws with a saw [gate] <u>frame</u> driven [via] <u>by</u> a slider-crank drive, the saw blades of which cut in only one stroke direction, the feed conveyor for the stock to be cut must be driven intermittently as a function of the cutting speed. To this end it is common practice to derive the feed drive for the feed conveyor from the slider-crank drive, for instance [via] <u>by</u> a ratchet drive, [whereby] the feeder conveyor for the stock to be cut [is] <u>being</u> connected with the slider-crank drive only during the cutting stroke. As the saw blades are [provided with a bias relative to] <u>cantilevered in the</u> stroke direction, so that the saw blades are disengaged from the stock to be cut during the return stroke while the feed conveyor is idle, the stock to be cut must first be advanced, [via] <u>by</u> the feed drive[,] towards the saw blades according to the saw blade disengagement, before any cutting engagement can take place. This requires a lead of the feed drive against the cutting stroke of the saw [gate] <u>frame</u>, resulting in a phase displacement between the slider-crank drive and the feed drive derived from the slider-crank drive, so that, as a consequence, the cutting speed reaches its maximum only after the [rate of] feed <u>speed</u>. This circumstance entails

[unregular] irregular chips over the cutting stroke and thus [unregular] irregular stresses of the saw blades with unfavorable consequences for the service life of the saw blades and for the cutting quality, in particular, when parquet lamellas [shall] are to be cut [of] from commercially available stock lumber.

[[0003]] Problems are similar when the feed conveyor for the stock to be cut is equipped with a motor separated from the slider-crank drive of the saw [gate] frame that is driven intermittently as a function of the slider-crank drive, for instance by [joining up] connecting the hydraulic motor of the feed drive intermittently [into] to the pump circuit [via] by a reversing valve (DE 34 06 455 A). Here the reversing valve is controlled [via] by a reversing shaft that is in a driving connection with the slider-crank drive. By intermittently reversing the control valve [via] by the reversing shaft, however, irregular saw blade stress cannot be avoided.

Summary of the Invention

[[0004]] The invention has therefore the object[ive] to design a mill saw of the above mentioned kind in such a way that favorable cutting [features] conditions are ensured to guarantee

a long service life of the saw blades at comparatively high cutting rates.

[[0005]] The object[ive] of the invention is achieved [in that the] <u>with a</u> controlling system connected to a signal transmitter for a preset position of rotation of the slider-crank drive [controls] <u>and controlling</u> the motor <u>for effectuating a conveying step</u> in dependence on the response of the signal transmitter according to a stored control program [for a conveying step] adaptable to the [respective] stroke frequency of the slider-crank drive.

[[0006]] To achieve, for example, a regular thickness of the saw chips over the cutting stroke that is favorable in terms of saw blade stress, the speed gradient of the feed conveyor must be exactly matched with the gradient of the cutting speed of the saw [gate] <u>frame</u> during the cutting stroke after overcoming the saw blade disengagement, which requires a sufficiently accurate motor control, if the feed drive is independent of the slider-crank drive. According to the invention, this accurate motor control is simply achieved in that, contrary to the conventional mechanical drive connection between the slider-crank drive and the feed conveyor, where each angle of rotation of the slider-

crank drive is [assigned] <u>coordinated</u> with an angle of rotation

for the motor of the feed drive, the motor is controlled [via] <u>by</u>

a controlling system according to a stored control program for a

conveying step, so that, for executing such a conveying step of

the feed conveyor, it is only required to [cycle] <u>time</u> the

controlling system [via] <u>by</u> the slider-crank drive. To this end

a signal transmitter for a preset position of rotation of the

slider-crank drive is [to be] provided. Due to the inertia of

the moving masses the prerequisite for such a control of the

driving motor [cycled] <u>timed</u> by the slider-crank drive, <u>namely</u>

that there be only a trifling change of the rotating speed during

the cutting stroke of the saw [gate] <u>frame</u>, is fulfilled in <u>the</u>

case of mill saws. It <u>is</u> only <u>required to adapt</u> [needs to be

provided for that] the chronological sequence of the stored

control program [is adapted] to the respective stroke frequency

of the slider-crank drive, which is not difficult at all, as [the

controlling system is admitted with] the respective stroke

frequency for a given position of rotation of the slider-crank

drive [via] <u>is transmitted to the controlling system by</u> the

signal transmitter.

[[0007]] Although basically each position of rotation of the

slider-crank drive is suitable for [cycling] <u>timing</u> the controlling system, <u>a</u> particularly favorable [constructional features are] <u>construction is</u> achieved[,] if the signal transmitter consists of a sensor for the dead center of the slider-rank drive at the end of the cutting stroke, as in this case the signal transmitter an be easily [assigned] <u>coordinated</u> with the saw [gate] <u>frame</u> guide, without having to provide complex adjustment facilities. The dead center at the end of a cutting stroke makes it possible for the feed drive to [set in] <u>begin operating</u> already with the next cutting stroke in spite of the lead necessary for overcoming the saw blade disengagement. [[0008]] The conveying distance of the stock to be cut for overcoming the saw blade disengagement depends only on the chosen [bias] <u>cantilever</u> of the saw blades, and is independent of the stroke frequency of the saw [gate] <u>frame</u>. Therefore, the controlling system may be provided with memories for a control program dependent on the speed of the slider-crank drive and one independent thereof, which latter provides for feeding the stock to be cut according to the saw blade disengagement determined by the [bias] <u>cantilever</u> of the saw blades. This [sub]division of the control program into one part dependent on the stroke

frequency of the saw [gate] <u>frame</u> and one independent thereof is particularly recommended[,] if the controlling system is connected to an input unit for difference control parameters, via which, for instance, the feed [shall] <u>into</u> be varied to adapt to various chip thicknesses.

[[0009]] If the feed drive is provided with two motors separately controllable [via] <u>by</u> the controlling system and [assigned with the feed conveyor] <u>arranged</u> in feed direction upstream and downstream of the saw [gate] <u>frame</u>, the feed conveyors upstream and downstream of the saw [gate] <u>frame</u> may be driven at different speeds, whereby the application of tensile [forces] and/or <u>pressure</u> forces [of pressure] to the stock to be cut in the cutting area becomes possible.

Brief Description of the Drawing

[[0010]] The drawing depicts an [example of the subject matter] <u>embodiment</u> of the invention.

FIG. 1   represents a schematic side view of the mill saw according to the invention.

FIG. 2   is a schematic block diagram of the slider-crank drive for the saw [gate] <u>frame</u> and the feed drive for the

stock to be cut.

FIG. 3   depicts the stroke gradient related to time of the saw
         [gate] <u>frame</u> driven [via] <u>by</u> the slider-crank drive and

FIG. 4   shows the speed gradient related to time of the saw
         [gate] <u>frame</u> on the one hand, and the speed gradient
         related to time of the feed drive, on the other hand.

Description of the Preferred Embodiment

[[0011]] In the example of embodiment according to FIG. 1 the
stand 1 of a mill saw is provided with a stroke guide 2 for a saw
[gate] <u>frame</u> 3 that can be driven to and fro by means of a
slider-crank drive 4.   The parallel saw blades 5 of the saw
[gate] <u>frame</u> 3 are gripped conventionally into a [gate] frame,
which is [borne] <u>adjustably cantilevered</u> in the saw [gate] <u>frame</u>
3 [with an adjustable bias].   For guiding the stock to be cut a
feed conveyor 6 is provided, which consists of driven conveyor
rolls 7 arranged upstream and downstream of the saw [gate] <u>frame</u>
3, [t which rolls 7].   The stock to be cut is pressed [via
snubber] <u>against conveyor rolls 7 by pressure</u> rolls 8, which can
be set [via] <u>by</u> adjustment cylinders 9.   Contrary to conventional
feed conveyors [6], the conveyor rolls 7 are not driven [via] <u>by</u>

the slider-crank drive 4, but [via] <u>by</u> separate motors 10 [with

a driving connection via] <u>connected thereto by</u> chain drives 11<u>,</u>

<u>as shown in</u> [Fig.] <u>FIG</u>. 2. [For controlling] These motors 10,

designed as gear motors, [there is] <u>are controlled by</u> a

controlling system 12<u>,</u> comprising a computer unit 13 according to

[Fig.] <u>FIG.</u> 2 [via] which [the setpoints are preset] <u>transmit</u>

<u>desired values</u> to the position controllers 14 for the motors 10.

On the basis of these [setpoints] <u>desired values</u> the motors 10

are controlled according to the <u>feed</u> requirements [of feed via]

<u>by</u> a [setpoint] <u>desired value</u> actual-value adjustment. The

selection of [setpoints if] <u>desired value is</u> effected [via] <u>by</u>

control programs stored in the program memories 15 and 16. [In

this connection the arrangement has been chosen such that] The

feed conveyor 6 performs one conveying step [each via] <u>by</u> the

[mtoros] <u>motors</u> 10, as soon as the controlling system 12 is

triggered [via] <u>by</u> a signal transmitter 17 for the dead center of

the slider-crank drive 4 at the end of a cutting stroke.

[[0012]   By the example of Fig.] <u>FIG.</u> 3 and [Fig.] <u>FIG.</u> 4

<u>explain</u> the control sequence for the motors 10 [can be explained]

in detail. [Fig.] <u>FIG.</u> 3 shows the gradient 18 of the stroke h of

the saw [gate] <u>frame</u> over the time t around a mean stroke

position h_m between an upper dead center h_o and a lower dead center h_u, with the cutting stroke in cutting direction of the saw blades ensuing from the downward movement of the saw [gate] _frame_ 3 from the upper dead center h_o to the lower dead center h_u.

Due to the sinusoidal stroke gradient 18 related to time of the saw [gate] _frame_ 3, the speed gradient related to time for the saw [gate] _frame_ 3 corresponds with the [characteristic] _curve_ 19 of [Fig.] _FIG._ 4. The speed v above the time base t is equivalent to the cutting speed of the saw blades 5 during the cutting stroke.

[[0013]] To be able to ensure a [regular] _uniform_ chip thickness over the cutting stroke, the feed conveyor 6 must be driven in phase with the saw [gate] _frame_ 3. An appropriate rate of feed V_s for the feed conveyor 6 is depicted in [Fig.] _FIG._ 4, from which it can also be inferred that, according to the speed gradient 19 below the time base t, there must not be any feed of the stock to be cut during the return stroke of the saw [gate] _frame_ 3.

[[0014]] The [bias] _cantilever_ of the saw blades 5 necessary for the disengagement of the saw blades 5 during the return stroke requires that the disengagement of the saw blades 5 against the

bottom of the cutting grooves must be overcome first, before the saw blades 5 are able to engage [into] the stock to be cut. This means that the feed conveyor 6 must be driven to lead in such a way that the stock to be cut is set to cutting position to the saw blades 5 at the beginning of a cutting stroke. To this end, the stock to be cut must be conveyed, prior to the cutting stroke, by a distance equivalent to the disengagement of the saw blades 5, which distance is determined by the adjusted [bias] cantilever, so that the necessary setting of the stock to be cut can be ensured at an appropriate speed gradient v_a [via] by the feed drive.

[[0015]] As the time period required for the advanced setting of the stock to be cut is determined at a speed gradient v_a selected by the program, only a lead time t_v needs to be allowed [for] to control, after response of the signal transmitter 17 at the time t_{s1} in the lower dead center h_u of the saw [gate] frame 3, the motors 10 according to the speed gradients v_a and v_s, which are ensured by the control programs in the memories 15 and 16. Each time the controlling system 12 is triggered [via] by the signal transmitter 17 at the time t_{s1} the feed drive is actuated according to the speed gradients v_a and v_s after a lead time t_v,

whereby the desired intermittent feed drive is ensured. As can

be [inferred from Fig.] seen in FIG. 3 and [Fig.} FIG. 4, the

time control of the motors 10 depends on the stroke frequency of

the slider-crank drive.. Therefore the speed gradient V_s must be

adapted to the respective stroke frequency, just as it is also

necessary to adapt the lead time t_v to the stroke frequency. For

this purpose, the control program stored in the memory 16 that

depends on the stroke frequency of the saw [gate] frame 3 is

computed with the respective stroke frequency in the computer

unit 13 in such a way that the respective [setpoints] desired

values can be preset [to] on the position controllers 14 as a

function of the respective stroke frequencies. The stroke

frequency proper is input [to] in the computer unit 13 [via] by

an averaging unit 20, so that possible variations can be

compensated.

[[0016]] To be able to adapt the rates of feed to the various

requirements, the parameters to be preset for this purpose can be

entered [to] in the controlling system 12 [via] by an input unit

21. Via these parameters, for instance, the amplitudes of the

speed gradients v_s may be varied, as [this is outlined] shown in

[dashes] broken lines in [Fig.] FIG. 4. Via appropriate

parameters, however, it is also possible to allow for variations in the [area of the bias] <u>cantilever</u> of the saw blades 5 to adapt the speed gradient v_a accordingly.